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## DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a finder with a diopter amendment device, and relates to a suitable finder with a diopter amendment device to correct the diopter difference of the short distance of a high scale-factor zoom finder, and a long distance especially.
[0002]
[Description of the Prior Art] generally, the diopter of a camera presupposes that -1D (diopter) extent the photographic subject of infinite distance appears near about 1m as an image is desirable -- having -- **** -- the design of the former to finder optical system -- setting -- a diopter -- about -- it is set up so that it may become about -1D.
[0003]
[Problem(s) to be Solved by the Invention] However, in connection with the long focusing of a camera, the finder scale factor is also formed into a high scale factor, and the diopter difference of the short distance at the time of focal actuation and a long distance poses a problem in recent years. For example, when it is 1.4 times the finder scale factor of this, to being -1D, in 0.6m, a diopter turns into about -4D and the fault that a finder image fades and appears in a 0.6m photographic subject produces it by infinite distance (infinity).
[0004] This invention was made in view of such a situation, and aims at offering the finder with a diopter amendment device which can correct the diopter difference of a short distance and a long distance.
[0005]
[Means for Solving the Problem] The migration lens supported free [ an attitude ] in accordance with the optical axis in the optical path of finder optical system in order that this invention might attain said purpose, A focus adjustment means to move a taking lens forward and backward according to a photographic subject, and to perform focus adjustment, It is a means to be interlocked with said focus adjustment means and to regulate the location of said migration lens, and when focus migration of said taking lens is carried out according to photographic subject distance, it is characterized by having the lens migration means to which said migration lens is moved so that the diopter of a finder may be maintained at abbreviation regularity.
[0006] According to this invention, if a taking lens is moved to a focus location with a focus adjustment means according to the distance to a photographic subject, the migration lens of finder optical system will be moved in accordance with an optical axis so that actuation of this focus adjustment means may be interlocked with and a lens migration means may maintain the diopter of a finder at abbreviation regularity. Thereby, the diopter difference of a finder can be reduced to the photographic subject of each distance from infinite distance (infinity) to near, and an always good finder image can be observed.
[0007] This invention can be applied to the so-called camera of the step zoom method which performs zooming and focusing by driving one cam member. In this case, as for the diopter difference of a short distance and a long distance, it is effective to prepare the

cam for diopter amendment so that the point which poses a problem especially by the finder of a high scale factor may be perceived, the focusing field of a tele edge may be interlocked with in the zoom finder to which the migration lens of finder optical system is moved by the cam according to the focal distance of a taking lens and it may let out the migration lens of finder optical system in accordance with an optical axis.

[0008]

[Embodiment of the Invention] It explains in full detail about the gestalt of operation of the finder with a diopter amendment device which starts this invention according to an accompanying drawing below. Drawing 1 is the perspective view showing the appearance of the camera with which the finder with a diopter amendment device concerning this invention was incorporated. While the camera cone 3 into which the taking lens 2 was built is attached in the transverse-plane center section of the camera 1 shown in this drawing and AF (automatic focus) floodlighting aperture 4, the finder object aperture 6, the self lamp floodlighting aperture 7, AE photometry aperture 8, and AF light-receiving aperture 9 are formed above said taking lens 2 in order from the left, the stroboscope aperture 10 is formed in the transverse-plane right corner section of a camera. Moreover, the shutter release 12 is formed in the top face of a camera 1.

[0009] Said taking lens 2 consists of zoom lenses of for example, two groups, and has two migration lens groups, a pre-group and a back group, which are not illustrated. An optical location is regulated by the zoom cam mentioned later, and these migration lens group is supported movable in the camera cone 3 approximately. The camera cone 3 has the zoom cam for the so-called step zoom which has the cam curve in which the zoom field which changes a photography scale factor gradually, and the focal field which performs focus adjustment for every photography scale factor were formed continuously, and can perform focus adjustment now with a photography scale factor by driving this one zoom cam (refer to drawing 2 ).

[0010] The motor which is not illustrated is formed in the interior of a camera 1, and it is transmitted to the finder cam (plate cam 80) for which the driving force of this motor regulates the location of the migration lens group of said zoom cam and the zoom finder mentioned later through a gearing driving mechanism. The zoom lever which is not illustrated is prepared in the tooth back of camera 1 body, while said motor drives and being able to choose a desired photography scale factor suitably by operating this zoom lever to a call or wide side, modification of the focal distance of a taking lens 2 can be interlocked with, the migration lens of finder optical system can move, a photography field angle, abbreviation, etc. can be by carrying out, and a visual field can be observed from the eye contacting part of a finder.

[0011] Moreover, the shutter (un-illustrating) is incorporated on the optical axis of the taking lens 2 of the camera 1 interior, and this shutter is interlocked with actuation of said shutter release 12, and operates. Inside said AF floodlighting aperture 4, AF light-receiving means is formed inside AF floodlighting means and said AF light-receiving aperture 9, and the ranging section which measures the distance to a photographic subject with these AF floodlighting means and AF light-receiving means is constituted. In addition, this ranging section (AF section) finds the distance to a photographic subject based on the principle of triangulation, and is used for automatic focus (AF) control by that result.

[0012] Inside said AE photometry aperture 8, AE photometry means containing a photo

detector is formed. By this AE photometry means, the outdoor daylight brightness within a photography visual field is measured, and that measurement result is used for automatic exposure control (AE control). In addition, about the configuration of the finder circumference, it mentions later ( drawing 3 ). An example of the development view of the cam configuration of the zoom cam which regulates the location of the pre-group of a taking lens 2 and a back group is typically shown in drawing 2 . The cam 14 for a pre-group drive is formed in a configuration in which the amount of displacement of the direction of an optical axis of a pre-group carries out linear change to the angle of rotation of a cam ring (un-illustrating). On the other hand, focusing field ** parallel to the cam 14 for a pre-group drive and zooming field ** which changes a photography scale factor gradually are formed continuously, and the cam 16 for a back group drive changes.
[0013] Five stationary points (Z1 -Z5) are formed in the zoom cam shown in this drawing to the angle of rotation of a cam ring, and a photography scale factor can be changed now into five steps. In addition, not only five steps but other numbers of steps are sufficient as the number of phases (number of steps) which can change a photography scale factor, and a call and a wide two-point change-over are sufficient as it. At the time of zoom actuation each stationary point supports the focal location of the infinite distance (infinity) in each focusing field, and according to actuation of a zoom lever, a taking lens 12 is surely Z1 -Z5. It stops in one of stationary points. Then, by AF actuation, a taking lens 2 lets out toward (c) along the focusing field of a cam a near side from the location of infinite distance (infinity), and focus adjustment is performed.
[0014] Drawing 3 is the perspective view of the zoom finder unit included in the interior of a camera 1. AF floodlighting means stowage 22, the finder optical-system stowage 24, the self lamp stowage 25, AE photometry means stowage 26, and AF light-receiving means stowage 28 are formed in the unit frame 20 sequentially from ******. In said finder optical-system stowage 24, the 1st migration lens group 30 and the 2nd migration lens group 32 which constitute an object system lens are arranged. And although not shown in this drawing, behind the 2nd migration lens group 32, the eyepiece frame holding erection optical system and an ocular is attached (refer to drawing 4 ).
[0015] Drawing 4 is the decomposition perspective view of the zoom finder unit included in the interior of a camera 1. The lens 34 for AF floodlighting is inserted in the opening aperture formed in the front face of AF floodlighting means stowage 32, and the infrared-emitting diode 36 called IRED is held and arranged behind this lens 34 at a frame 37. In addition, the shielding plate 38 for protection from light is formed behind an infrared-emitting diode 36.
[0016] The lens 40 for AF light-receiving is inserted in the opening aperture formed in the front face of AF light-receiving means stowage 28, and the photo detectors (PSD) 42, such as a photodiode, are arranged behind this lens 40. The mask member 43 by which opening which specifies the exposure range of the light-receiving side of this photo detector 42 was formed in the front face of a photo detector 42 is arranged. In addition, the location of opening is established in this mask member 43 possible [ fine tuning ] to the light-receiving side of a photo detector 42 through the eccentric screw 44. Moreover, behind said photo detector 42, the shielding plate 46 for protection from light is formed.
[0017] The lens for AE light-receiving which is not illustrated is built into the opening aperture formed in the front face of AE photometry means stowage 26, and a photo detector 48 is arranged through the supporter material 49 behind this lens. In addition,

photoconductor (CdS) is used for this photo detector 48. The light emitting diode 50 turned on at the time of self-timer use is held and contained with a reflector 51 by the self lamp stowage shown with the sign 25 in drawing at the cylindrical shape-like supporter material 52.

[0018] In the finder optical-system stowage 24, the 1st migration lens group 30 and the 2nd migration lens group 32 which constitute an object system lens as drawing 3 explained are arranged. One lens 54 is held at the 1st frame 56, the 1st migration lens group 30 changes, three lenses 57, 58, and 59 are held in one at the 2nd frame 60, and the 2nd migration lens group 32 changes.

[0019] Projections 62 and 64 are formed in the left lateral of said 1st and 2nd frame 56 and 60, and sliding fitting of these projections 62 and 64 is carried out to the left-hand side wall surface of the finder optical-system stowage 24 in the straight-line slot (un-illustrating) formed in an optical axis and parallel. Moreover, the guide holes 66 and 68 are really formed in the right lateral of said 1st and 2nd frame 56 and 60, and the follower pins 70 and 72 protrude on the inferior surface of tongue of each guide holes 66 and 68, respectively (R> drawing 5 5 reference). The guide shaft 74 is inserted in said guide holes 66 and 68, the front end of the guide shaft 74 is pressed fit in the hole which was formed in the front wall of the unit frame 20 and which is not illustrated, and the back end of the guide shaft 74 is pressed fit and fixed to the hole which was formed in the posterior wall of stomach of the unit frame 20 and which is not illustrated.

[0020] On the other hand, a slit 76 is formed in an optical axis and parallel in finder optical-system stowage 24 base, and said follower pins 70 and 72 are loosely inserted in this slit 76. The C character-like spring 77 is passed among both the follower pins 70 and 72, and it is energized in the direction in which the 1st frame 56 and the 2nd frame 60 keep away mutually with this spring 77. The plate cam 80 which regulates the optical location of said 1st frame 56 and 2nd frame 60 is formed in the base of the unit frame 20 possible [ the slide to a longitudinal direction ]. About the configuration of a plate cam 80, it mentions later further.

[0021] The follower pin 70 of said 1st frame 56 engages with the 1st cam groove 82 formed in the plate cam 80, and the follower pin 72 of said 2nd frame 60 engages with the 2nd cam groove 84 formed in the plate cam 80. While the 1st and 2nd migration lens groups 30 and 32 are guided movable in accordance with an optical axis by this configuration approximately, the follower pin 70 of the 1st frame 56 is pressed against the regulation side by the side of before a cam groove 82 by operation of said spring 77, and the follower pin 72 of the 2nd frame 60 is pressed against the regulation side on the backside [ a cam groove 84 ]. The 1st and 2nd migration lens groups 30 and 32 contact the regulation side of a cam without backlash by this, and both optical location is regulated.

[0022] The rack 86 is formed in the plate cam 80, this rack 86 is connected with the motor (un-illustrating) which drives the camera cone 3 of a taking lens 2 through the gearing transfer device (moderation system) which is not illustrated, and the driving force of said motor is transmitted to a plate cam 80 through said gearing transfer device. Behind the 2nd migration lens group 32, two prism 88 and 89 and oculars 90 which act as erection optical system of a finder are arranged, and the visual field frame 91 is arranged between prism 88 and 89. the ocular housing object 94 (it is hereafter called an eyepiece frame for short) with which it is contained by the supporter material 92, said prism 88

and 89 and the visual field frame 91 being positioned by the position, respectively, and this supporter material 92 supports an ocular 90 -- bis--- it is attached from the bottom through 95. And this eyepiece frame 94 is connected with said unit frame 20 through a screw 96.

[0023] Projection 97 is formed in the left lateral of an ocular 90, and sliding fitting of this projection 97 is carried out to the straight-line slot (un-illustrating) formed in an optical axis and parallel at the left-hand side internal surface of the eyepiece frame 94. Moreover, the guide hole 98 is really formed in the right lateral of an ocular 90, and the follower pin which is not illustrated protrudes on the right lateral of this guide hole 98. A coil spring 100 is formed between an ocular 90 and the eyepiece frame 94, and the guide shaft 102 is inserted in this coil spring 100 and said guide hole 98. The front end of the guide shaft 102 is pressed fit in the hole (un-illustrating) formed in the eyepiece frame 94, and the back end of the guide shaft 102 is pressed fit and fixed to the hole 105 formed in the holddown member 104.

[0024] While said ocular 90 is energized towards the method of drawing Nakaato with said coil spring 100, the follower pin of an ocular 90 engages with the cam formed inside the revolving dial 106. An ocular 90 is guided movable in accordance with an optical axis by this configuration approximately, and moves forward and backward in accordance with an optical axis by it according to rotation actuation of a revolving dial 106. Therefore, a diopter can be adjusted by operating a revolving dial 106.

[0025] It is the perspective view showing the connection relation between a unit frame and a plate cam in drawing 5 . The 1st cam groove 82 which regulates the location of the 1st migration lens group 30, and the 2nd cam groove 84 which regulates the location of the 2nd migration lens group 32 are formed in a plate cam 80, and the follower pin 70 of the 1st frame 56 and the follower pin 72 of the 2nd frame 60 are engaging with each cam grooves 82 and 84, respectively as drawing 4 explained. Moreover, the guide slots 110, 111, and 112 are formed in the slide direction and parallel which are shown by the said drawing Nakaya mark, and the hooks 114, 115, and 116 which protruded on the base of the unit frame 20 engage with a plate cam 80 in each guide slots 110, 111, and 112.

[0026] Moreover, the rack 86 formed in the plate cam 80 gears with the pinion which is interlocked with the motor (un-illustrating) which drives the camera cone 3 of a taking lens 2 and which is not illustrated, and the slide drive of the plate cam 80 is carried out by the drive of said motor with the direction of the arrow head of drawing at parallel.

Drawing 6 is the top view of a plate cam 80. In the 1st cam groove 82 which specifies the location of the 1st migration lens group 30, and the 2nd cam groove 84 which specifies the location of the 2nd migration lens group 32, the location shown with the sign A in drawing is a location of each migration lens group corresponding to the infinite distance (infinity) location of a tele edge. Although the diopter of the camera concerned is set as -1D (diopter) extent the photographic subject of infinite distance appears near about 1m as an image, with the gestalt of this operation, cam field ** for diopter amendment is continuously formed in the left-hand side in drawing with this location A as the starting point.

[0027] Cam field ** for this diopter amendment is interlocked with that a taking lens 2 moves to a near side along the focusing field of P5 infinity - P5c shown by drawing 2 , and it is formed so that it may let out the 1st migration lens group 30 and the 2nd migration lens group 32 in accordance with an optical axis. When a taking lens 2 is

located in the maximum near location (P5c) of said focusing field, the 1st and 2nd migration lens groups 30 and 32 are located in the location B at the left end of cam field ** for diopter amendment, respectively. At this time, the configuration of the cam for diopter amendment is formed so that the photographic subject of point-blank range (for example, 0.6m) may appear as an image near about 1m. In addition, although signs that the cam field for diopter amendment of the 1st cam groove 82 and the cam field for diopter amendment of the 2nd cam groove 84 were formed in abbreviation parallel are shown by drawing 6 , it is also possible to form so that it may let out the cam field for one [ at least ] diopter amendment to an optical axis.

[0028] Next, an operation of the constituted finder with a diopter amendment device is explained like the above. When a photography person operates a zoom lever and changes the focal distance of a taking lens 2, the driving force of a motor is transmitted to the rack 86 of a plate cam 80, the drive of a taking lens 2 is interlocked with, and a plate cam 80 slides.

[0029] The 1st and 2nd migration lens group engaged, respectively is moved to the 1st and 2nd cam grooves 82 and 84 of this plate cam 80 along the regulation side of each cam groove by the drive of this plate cam 80, and the scale factor of a finder is changed. Thus, the visual field range which suited the photography scale factor can observe through an ocular 90 because zoom actuation is interlocked with and the 1st and 2nd migration lens group of finder optical system moves.

[0030] Moreover, if specified quantity pushing actuation (half-push) of the shutter release 12 is carried out when a taking lens 2 is set as a tele edge, AF and AE function will operate. That is, while the infrared-emitting diode 36 shown in drawing 4 R> 4 emits light, reading of the light-receiving signal by the photo detector 42 for AF light-receiving and the photo detector 48 for AE photometry is started, and measurement (photometry) of outdoor daylight brightness is performed in the measurement (ranging) list of the distance to a photographic subject.

[0031] And a camera cone 3 drives in order to move a taking lens 2 to a focus location based on the above-mentioned ranging data. stationary point Z5 which is equivalent to an infinite distance (infinity) location among the cam curves of the step zoom which showed this focusing actuation to drawing 2 (P5 infinity) from -- a taking lens 2 lets out towards a near side (P5c) along a focusing field. The drive of this taking lens 2 is interlocked with, and the 1st and 2nd migration lens groups 30 and 32 of finder optical system move along with cam field ** for diopter amendment of a plate cam 80. By this, to the photographic subject of each distance from infinite distance (infinity) to near, a diopter is amended so that a photographic subject may appear as an image near about 1m, and an always good finder image can be observed.

[0032] With the gestalt of the above-mentioned implementation, although the camera of a step zoom method was explained to the example, this invention can be applied also to cameras other than a step zoom method, and the diopter difference of a short distance and a long distance can apply it to the high scale-factor finder made remarkable widely.

[0033]

[Effect of the Invention] According to the finder with a diopter amendment device which starts this invention as explained above Since it was made to move the migration lens of finder optical system in accordance with an optical axis so that actuation of a focus adjustment means to move a taking lens to a focus location according to the distance to a

photographic subject might be interlocked with and the diopter of a finder might be maintained at abbreviation regularity The diopter difference of a finder can be corrected to the photographic subject of each distance from infinite distance (infinity) to near, and an always good finder image can be observed.

[0034] When applying to the so-called camera of the step zoom method which performs zooming and focusing by driving one cam member especially, the diopter difference of the short distance in the tele edge where a finder scale factor is high, and a long distance can be effectively corrected by preparing the cam for diopter amendment so that the focusing field of a tele edge may be interlocked with and it may let out the migration lens of finder optical system in accordance with an optical axis.

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[Translation done.]